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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,388	11/14/2001	Mark M. Wang	267/006	4938

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EXAMINER

JOHNSTON, PHILLIP A

ART UNIT

PAPER NUMBER

2881

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,388

Applicant(s)

WANG ET AL.

Examiner

Phillip A Johnston

Art Unit

2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 28 October 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Detailed Action

Claims Rejection – 35 U.S.C. 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Publication 2002/0058332 to Quake, in view of Zarling U.S. Patent No. 6,399,397

Quake (332) discloses an apparatus for optical trapping of particles that includes the use of a microfluidic device for analyzing and/or sorting biological materials (e.g., molecules such as polynucleotides and polypeptides, including proteins and enzymes; viruses and cells) and methods for its use. The microfluidic device comprises a main channel and an inlet region in communication with the main channel at a droplet extrusion region. Droplets of solution containing the biological material are deposited into the main channel through the droplet extrusion region. A fluid different from and incompatible with the solution containing the biological material flows through the main channel so that the droplets containing the biological material do not diffuse or mix. Biological material within the droplets can be analyzed and/or sorted by detecting a

predetermined characteristic of the biological sample in each droplet and sorting the droplet accordingly. See Abstract, front page. In addition, the planar geometry of the device, as recited in Claim 4, allows the use of high numerical aperture optics, thereby increasing the sensitivity of the system. See Page 2, paragraph [0014]

Quake (332) also discloses A silicon substrate containing the microfabricated flow channels and other components is preferably covered and sealed, most preferably with a transparent cover, e.g., thin glass or quartz, as recited in Claim 6, although other clear or opaque cover materials may be used. When external radiation sources or detectors are employed, the detection region is covered with a clear cover material to allow optical access to the cells. See Page 11, paragraph [0097], and Figures 1A-1D

Quake (332) further discloses the use of an optical trap, or laser tweezers, to sort or direct cells in a PDMS device. One exemplary method to accomplish this is to prepare an optical trap, methods for which are well known in the art, that is focused at the "T" intersection proximate to, and preferably downstream of, the detection region. Different pressure gradients are established in each branch. A larger gradient at one branch channel creates a dominant flow of particles or cells, which should be directed into the waste channel. A second, smaller gradient at another branch channel should be established to create a slower flow of fluid from the "T" intersection to another channel for collection. The optical trap remains in an "off" mode until a desired particle is detected at the detection region. After detection of a desired characteristic, the particle or cell is "trapped", and thereby directed or moved into the predetermined

branch channel for collection. The particle or cell is released after it is committed to the collection channel by turning off the trap laser. The movement of the cell or particle is further controlled by the flow into the collection well. The optical trap retains its focus on the "T" intersection until the detection region detects the next cell or particle. See Page 25, paragraph [0240]

Quake (332) also teaches, that a differential in the index of refraction between two phases of a droplet system, e.g. where droplets of one phase are separated or encapsulated by another phase, may be exploited to move or direct droplets in response to radiation pressure, as recited in Claim 9. This technique can also be applied to any objects, including without limitation cells, molecules, etc. that have a different refractive index than the surrounding medium. In particular, radiation pressure (e.g. an optical beam) can be used to advantageously sort objects (e.g. droplets) whose index of refraction is lower than that of the surrounding medium. See Page 25, paragraph [0241]

Quake (332) as applied above does not disclose the use of an adhesive surface for adhering the separated particles to the second surface. However, Zarling (397) discloses an apparatus for optical cell sorting, where wick D2 wicks up a portion of a sample fluid D8, which is suspected of containing the target antigens. Target antigens bind to the antibodies present at a capture surface D9. Capture surface D9 is positioned at the focal point of source D3. The target antigens can be labeled with phosphor-antibody conjugates either before or after capture. In the preferred embodiment wick D2 is formed of glass. In this configuration capture surface

D9 is prepared simply by filling the inside of the capillary with a bubble containing the antibodies of interest. By silanizing the inner surface with organofunctional silanes, conventional chemistries can be used to covalently link the antibodies or other biological macromolecule(s) to the inner tube wall at the site of the liquid bubble. The surface energy of the capillary is also easy to modify by silanization, which will help prevent nonspecific reagent and antigen adherence to the walls of the tube. See Column 39, line 8-24.

Therefore it would have been obvious to one of ordinary skill in the art that Quakes' (332) optical trapping apparatus and method can be modified to use the analyte adhesion technique in accordance with Zarling, if so desired.

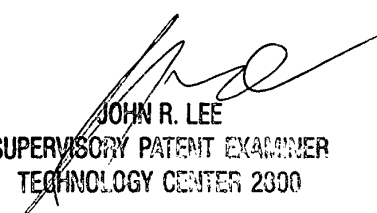
Conclusion

3. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (703) 305-7022. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (703) 308-4116. The fax phone numbers are (703) 872-9318 for regular response activity, and (703) 872-9319 for after-final responses. In addition the customer service fax number is (703) 872- 9317.

Application/Control Number: 09/993,388
Art Unit: 2881

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

PJ
February 10, 2003



JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2000